



High dose extrapolation in climate change projections of heat-related mortality

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Abstract:

One challenge for statisticians and epidemiologists in projecting the future health risks of climate change is how to estimate exposure-response relationships when temperatures are higher than at present. Low dose extrapolation has been an area of rich study, resulting in well-defined methods and best practices. A primary difference between high dose and low dose extrapolation of exposure-response relationships is that low dose extrapolation is bounded at no exposure and no (or a baseline) response. With climate change altering weather variables and their variability beyond historical values, the highest future exposures in a region are projected to be higher than current experience. Modelers of the health risks of high temperatures are making assumptions about human responses associated with exposures outside the range of their data; these assumptions significantly affect the magnitude of projected future risks. Further, projections are affected by adaptation assumptions; we explore no adaptation (extrapolated response); individual (physiological) adaptation; and community adaptation. We present an example suggesting that linear models can make poor predictions of observations when no adaptation is assumed. Assumptions of the effects of weather above what has been observed needs to be more transparent in future studies. Statistical simulation studies could guide public health researchers in identifying best practices and reducing bias in projecting risks associated with extreme temperatures. Epidemiological studies should evaluate the extent and time required for adaptation, as well as the benefits of public health interventions.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Temperature

Temperature: Extreme Heat

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Climate Change and Human Health Literature Portal

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Sweden

Health Impact: 

specification of health effect or disease related to climate change exposure

Morbidity/Mortality

Mitigation/Adaptation: 

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: 

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Resource Type: 

format or standard characteristic of resource

Research Article, Research Article

Timescale: 

time period studied

Short-Term (

Vulnerability/Impact Assessment: 

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content